MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2018/2019

PEM0044 – ESSENTIAL MATHEMATICS

(All sections / Groups)

14 MARCH 2019
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **FOUR (4)** printed pages with 4 questions only, excluding the cover page.

2. Answer all **FOUR (4)** questions.

3. Write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

4. The formula sheet is attached at the end of this question paper.

Question 1 (25 Marks)

(a) Perform the indicated operations and simplify the answers.

(i) $\left(2x^2+3xy-1\right)+\left(3z^2+2xy+4\right)$

[2 marks]

(ii) $\dfrac{\dfrac{x+2y}{x}}{\dfrac{x-y}{3x}}$

[4 marks]

(b) Solve the following equation.

$$\frac{1-3x}{3}+\frac{2x+4}{6}=3$$

[4 marks]

(c) Solve the following inequality. Represent the range on the real number line.

$$\frac{3}{2}x+3(2+x)>1$$

[6 marks]

(d) Use the quadratic formula to solve the following function.

$$4x^2+3x=1$$

[6 marks]

(e) Find an equation of the straight line that passes through point (-3, 1) and has a slope -4.

[3 marks]

Continued...

Question 2 (25 Marks)

(a) Given that $A = \begin{bmatrix} -1 & 2 \\ 4 & -3 \\ 0 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 0 & 4 \\ 2 & 6 & 3 \end{bmatrix}$. Find

(i) $3A - B^T$,

[5 marks]

(ii) AB.

[2 marks]

(b) Consider the following system of equations.

$$x + 2z = 3$$
$$x - 2y + z = 4$$
$$3y + z = 6$$

(i) Write the system of equation above in a form $Ax = B$.

[3 marks]

(ii) Find the determinant, minor and the inverse of matrix A.

[12 marks]

(iii) Find the value of x, y and z.

[3 marks]

Question 3 (20 Marks)

(a) Given the arithmetic sequence is 1, 8, 15, 22, ...

(i) Find the first term and the common difference.

[4 marks]

(ii) Find the 12^{th} term.

[4 marks]

(b) Given that the fifth term of an arithmetic sequence is 40 and its tenth term is 80, find the sum of the first 20 terms.

[8 marks]

(c) Given the geometric sequence is $3, \frac{1}{3}, \frac{1}{27}, \ldots$, find the n^{th} term.

[4 marks]

Continued...

Question 4 (30 Marks)

(a) Find the first derivative of the following functions. Simplify your answer.

(i) $y=\frac{3}{5}x^{\frac{2}{3}}+\frac{1}{2}x^{\frac{1}{4}}+x^{-\frac{1}{3}}$

[3 marks]

(ii) $y=\left(3x^4-7x^2\right)\left(2x+1\right)$

[6 marks]

(iii) $y=\frac{2x^2-3}{x^4+1}$

[6 marks]

(b) Find the first derivative of the following function using the power rule.

$$y=\left(3x^2+2x-1\right)^7$$

[5 marks]

(c) Evaluate each of the following integrals:

(i) $\int\left(x^4+2x^3-5x\right)dx$

[2 marks]

(ii) $\int\left(\frac{1}{2}+16x\right)^4 dx$

[8 marks]

End of Page.

Summary of Formulas

1. Basic Rules of Differentiation

i) $f'(x)=0$

ii) $f'(x)=nx^{n-1}$

iii) $cf(x)=cf'(x)$

iv) $f(x)\pm g(x)=f'(x)\pm g'(x)$

v) $f'(x)=u\dfrac{dv}{dx}+v\dfrac{du}{dx}$

vi) $f'(x)=\dfrac{v\dfrac{du}{dx}-u\dfrac{dv}{dx}}{[v]^2}$

vii) Chain rule: $\dfrac{dy}{dx}=\dfrac{dy}{du}\times\dfrac{du}{dx}$

viii) General power rule: Derive $[f(x)]^n=n[f(x)]^{n-1}f'(x)$

2. Basic Rules of Integration

i) $\int k\ du=ku+C$

ii) $\int u^n du=\dfrac{u^{n+1}}{n+1}+C$

iii) $\int kf(u)\ du=k\int f(u)\ du$

iv) $\int[f(u)\pm g(u)]\ du=\int f(u)du+\int g(u)du$